Public Works (1912) Department.

~~RAILWAYS.~~

G.O., No. 274 I.

DATED 25-7-1912.

The Notes
in this G.O. have been printed.

[Despatch Abstract.]

No. 1 Branch Channel, Periyar System, Madura district: Sanctioning, with remarks, an estimate of Rs. 7,909 inclusive of establishment charges for certain improvements to—

Indexed. Rect. & Ind. 27/7

[P. W. 9 (a). 500—27-7-11.]

F. E. I. Registered as No. 39 of 1912-13

BACK PAPERS.

G.O.	No.	Department	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No	Department	Date.	G.O.	No.	Department.	Date

Government of Madras.

PUBLIC WORKS DEPARTMENT.

IRRIGATION.
ACCOUNT.

Recd.	1912.	*Enclosures*
Regd.		*Spare copies*

G.O. No. 274 I., 25th July 1912.

No. 1 Branch Channel, Periyar System Madura District

Sanctioning, with remarks, an estimate of Rs. 7,909 inclusive of establishment charges for certain improvements to — .

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers: —

I

Letter—from H. E. CLERK, Esq., Superintending Engineer, VI Circle.
To—the Chief Engineer for Irrigation.
Dated—Trichinopoly, the 15th February 1910.
No.—192 C.E.

Inspection Notes of H. E. Clerk, Esq., Superintending Engineer, VI Circle, 7th to 11th February 1910.

PERIYAR SYSTEM—*Head Works.*—The old anicut has been removed for some depth below the river bed with the result that it has appreciably lowered. There are, however, some large shoals in front of the regulator and the sand in the main canal remains about the same, *i.e.*, 3 feet in depth. A good deal of water is now being passed down and a good deal of scouring can be done by working the regulator shutters judiciously and also by working the Ramarajapuram surplus which has now been altered and was worked with considerable effect this year.

> It will, I fear, always remain the same unless the main canal is regraded so as to work to the critical velocity theory.
>
> I am now doubtful if the working of this regulator will effect any material improvement, but I am open to conviction from any actual results which may be attained.
>
> C. A SMITH—7-4-10.

The inability of the lower reaches of the canal to carry full supply was, I believe, somewhat exaggerated on Irrigation Chief Engineer's inspection last year. The second and third reaches are undoubtedly silted but this year 6 feet on the drop was maintained on several occasions. At this depth it was necessary to erect small turf bunds on the parapet of the aqueducts but otherwise no difficulty was experienced.

> I can offer no opinion on this without a study of actual cross-sections, water levels and velocities from which, if available for last year, useful conclusion might be drawn.
>
> C.A.S.—7-4-10.

The heading up at syphon super-passages is not excessive. I had several measured when 5 feet was passing over drop No. 1; the greatest afflux was ·34. I noticed, however, that the bridge just below the Ramarajapuram surplus work was submerged almost to the crown of the arch and it is probable that an additional span might be useful here. It will be a matter of extreme difficulty to devise a means of increasing the velocity in the second and lower reaches. In view of the comparative efficiency of the main canal, I would deprecate any immediate action. I am also inclined to doubt whether it is necessary to lower drop No. 1. Doing so would no doubt reduce silting in the first reach, but it would increase it in the second where judging by water-marks on the bridges silting is worst. My recommendations, therefore, in this respect are to take up the improvement and remodelling of branch channels first where necessary making allowance

> It may not be necessary to increase the velocity. It is possible in some cases to comply with the critical velocity theory by working the channel with increased width and decreased depth.
>
> I am by no means sure that the lowering of the drop will make any difference to the lower reaches after the first reach has attained its permanent regime under the new conditions, *i.e.*, with an increased bed fall and a correspondingly increased surface fall.
>
> You have obtained the same result by the extra plank on the regulator shutters which is a less satisfactory method than lowering the drop.
>
> It is requested that the matter may be reconsidered in the light of the above remarks.
>
> As regards main canal first reach see separate orders passed on Superintending Engineer's No. 334, dated 21st March 1910.
>
> C.A.S.—7-4-10.

for extensions within the area. When this is done and the ayacut maps prepared we can tell the actual discharge required in each reach and experience will have shown us the best way to improve the main canal. The following remarks on details are made:—

Sluice at 4-6.—A new sluice has been built to replace a ruined one. Masonry complete. The curve of the concrete arch is not very true. The appearance may be corrected in plastering; the gearing is not yet erected.

Andipatti Overseer's bungalow.—Complete except for a few items. The jungle-wood doors, etc., supplied, I am told, by Messrs. Chisholm & Ewart are very rough and the wood (probably pillai marudu) was not well seasoned. A well was built and is required. The estimate for it was sent to me lately and I refused to sanction it without further information. If resubmitted, it will be sanctioned, but the procedure of the late Executive Engineer, Mr. DeChazal, by which the work was carried out was most irregular.

The weir at 22-4 has deen blocked up with a turf bund. It is very strong and has a considerable growth of rushes in front of it. A much weaker bund should be made and its top should be 1′ 6″ above theoretical F.S.L. in the canal.

At 25 miles 7 furlongs is a 12-inch pipe sluice close to which quite high land is being lowered. As it is far too high to irrigate, this lowering should be stopped at once.

From here to Kallandri the banks are not as well kept as in the other reaches. This is said to be due to the inactivity of Sub-overseer G. Venkatrama Aiyar.

No. 4 Branch channel.—I inspected a portion of this. During Mr. DeChazal's régime it is stated that it was impossible to get water to the end of this channel. This year with continuous flow no difficulty has been observed.

> Satisfactory. Please see may inspection notes on this channel of February 1909.
> C.A.S.—7-4-10.

Thandalai off-take.—This channel which was in very bad order last year has now been cleared to section and is in good order. I observed one or two dams erected in the channel.

No. 1 Branch channel.—This runs for about $1\frac{1}{2}$ miles, is then joined by the Vadakarai channel and flows into Vadakarai tank. Thence it issues and runs for about $4\frac{1}{2}$ miles. It is in very bad order throughout. The Vadakarai channel, an old native channel, irrigating about 2,000 acres direct as well as (nominally) supplying Vadakarai tank, is in very bad order; it receives much cross drainage. It has no proper surplus weirs and its sluices are of the most primitive description.

Three proposals have been made—

(1) to improve it and resluice it;

(2) to abandon it altogether and sell the land it occupies;

(3) to leave it as it is.

The first course would be expensive and unnecessary. The second would probably be objected to by the ryots and has the objection that the right bank forms a cart-road which is apparently a good deal used and culverts for passing the water would have to be maintained.

I am, therefore, in favour of leaving it alone and passing down only so much water as is absolutely necessary for direct irrigation.

The tank supply should be given through No. 2 Branch channel which is quite large enough. Below Vadakarai tank the channel should only be designed for its direct ayacut, the supply for tank lands being given through tank sluices and passed across the channel by small aqueducts. All the works require thorough reconstruction and repair and this work should be taken up at an early date.

> But what was it designed for originally? Cannot the channel command these lands? Taking one irrigation channel across another is not, in my opinion, a very sound system and it is better to avoid it if possible to do so.
> C.A.S.—7-4-10.

I am much struck by the improvement in this system since Mr. Hart took charge. Evidence of care is abundant. The channel banks and pathways show that work is exacted from bankers. The season has been a favourable one in that there was an ample lake supply and there was heavy rain in August and September but after that there were long periods of drought and water has been distributed regularly and as far as shown without complaint. He is, however, nearly powerless to prevent ryots' interfering with sluices, erecting dams in channels and irrigating high level land without permission. The penal assessment of $1\frac{1}{2}$ times the water-rate imposed is quite inadequate.

I am very pleased to hear this.

Chittanai anicut—Is 2 miles 5 furlongs below the Peranai regulators. The anicut has had no repairs done to it for some years but is in very good order. The anicut has silted up to its crest. There is about 7 feet drop in rear but this, I understand, is decreasing. The Tenkarai channel irrigates about 2,000 acres directly and supplies Tenkarai tank which has an ayacut of about 800 acres. The channel is very tortuous; it has a bed fall of about 6 feet per mile and is in very bad order.

Mr. Hart has suggested breaching the Chittanai and taking the Tenkarai channel head off from Peranai at the same time remodelling the Tenkarai channel. The advantage of this would be that the river-bed at Peranai would be considerably lowered and scientific distribution under the Tenkarai channel would be possible.

The cost of these improvements would be very great, probably almost Rs. 50,000, and there would be no pecuniary return. I am therefore in favour of leaving things as they are. Should in the future an increased supply be available with a bigger tunnel, a right bank canal may be taken up and these improvements can then be considered.

C.A.S.—7-4-10.

H. E. CLERK,
Superintending Engineer, VI Circle.

II

Memorandum R.O.C. No. 711/10, dated 7th April 1910.

Forwarded to the Superintending Engineer, VI Circle, for perusal of the remarks above of the Chief Engineer for Irrigation and return.

(By Order.)

J. M. LACEY,
Asst. Chief Engineer for Irrigation.

III

Letter—from T. W. S. SMYTH, Esq., Superintending Engineer, VI Circle.
To—the Chief Engineer for Irrigation.
Dated—Camp Kodāikanal, the 3rd June 1910.
No.—545 C.E.

[*Reference*—Your No. R.O.C. 711/10, dated 7th April 1910.]

I have the honour to return herewith your remarks on Mr. Clerk's inspection notes for February 1910.

Head works.—Please see my letter No. 2803, dated 19th May 1910, to the Executive Engineer, copy of which was sent to you regarding the design of the first reach.

2. There are no records available of discharges and velocities; these will be collected this year and I think the question of improvements cannot be satisfactorily dealt with until they are available.

No. 1 *Branch channel and old Vadakarai channel.*—The major portion of the surplus from the latter is lost so far as Periyar revenue is concerned, as it enters the Vaigai below Chittanai anicut and most of it, I believe, goes down the Nelayur channel. I think it should be resluiced, but only water for direct supply sent down it.

Vadakarai tank is supplied by Nos. 1 and 2 Branch channels. No. 1 carries 100 cusecs and No. 2 thirty cusecs, which include the supply for their direct ayacuts above the tank.

G.O. No. 25; I., dated 12th March 1901.

No. 1 branch below Vadakarai tank carries 50 cusecs for 2,073 acres including supply to Nedungulam, Thenur Periya Arasangulam and Paravai tanks—*vide* report of its complete repair in 1901, to be kindly returned.

The channel has apparently been allowed to get into bad order again but there seems to be no reason for altering its design. It cannot to my knowledge command a large area of land on the north side as it crosses the fall of the land towards the Vaigai diagonally.

IV

Memorandum R.O.C. No. 711/10, dated 16th June 1910.

With reference to letter No. 545 C.E., dated 3rd June 1910, from the Superintending Engineer, VI Circle, returning Mr. Clerk's inspection notes on the Periyar System, the Chief Engineer for Irrigation has the honour to state that the question of resluicing No. 1 Branch channel above the Vadakarai tank should be considered and if the cost is justifiable the necessary estimate should be prepared.

2. It is presumed that the necessary steps will be taken to put the No. 1 Branch channel below the tank into proper repairs.

3. The report referred to in paragraph 2 of the Superintending Engineer's letter is returned herewith.

C. A. Smith,
Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.

V

Reminder to the Supg. Engr.,	VI	Circle,	dated	2nd September 1910.		
From the	,,	VI	,,	,,	1st October ,,	No. 994 C.E.
Reminder to	,,	VI	,,	,,	16th December ,,	
From the	,,	VI	,,	,,	16th January 1911,	No. 59 C.E.
Reminder to	,,	VI	,,	,,	8th May 1911.	
From the	,,	VI	,,	,,	22nd ,, ,,	No. 554 C.E.

VI

Letter—from C. Mildred, Esq., A.M.I.C.E., Superintending Engineer, VI Circle.
To—the Chief Engineer for Irrigation.
Dated—Trichinopoly, the 22nd July 1911.
No.—798 C.E.

As called for in your Memorandum R.O.C.No. 711/10, dated 16th June 1910, and with reference to the correspondence ending with this office No. 554 C.E., dated 22nd May 1911, I have the honour to forward herewith for your approval and sanction of Government an estimate amounting to Rs. 6,400 for improvements to the 1st Branch channel, Periyar System.

2. The Executive Engineer, Madura division, has, in the report attached to the estimate, so exhaustively and clearly explained the necessity for, and the details of, the works proposed that there is little for me to add.

As the proposed improvements are in no way directly remunerative in themselves, and no increase in revenue under the channel can be expected, yet by carrying out the proposed works not only a large quantity of valuable water which is now reported to be wasted in the channel can be saved and utilized in other branches of the main canal, but also the difficulty of supplying water to the lands under the 1st Branch channel itself in its present condition can be got over. In these circumstances, I request that you will be pleased to obtain the sanction of Government to the estimate.

An estimate amounting to Rs. 6,350 for thorough repairs to the 1st Branch channel, which will be sanctioned by me when the estimate for improvements is received sanctioned, is also herein enclosed for your reference.

3. It will be seen from a statement attached to the estimate that the cost (viz., Rs. 1,040) of existing works which are now proposed to be replaced or improved will have to be written back with reference to Public Works Code, paragraph 1921, to the Revenue account of the system from the Capital account against which it has been originally charged. The work will be completed before the end of 31st March 1913.

VII

Memorandum R.O.C. No. 711/10, dated 7th October 1911.

With reference to letter No. 798 C.E., dated 22nd July 1911, from the Superintending Engineer, VI Circle, forwarding for sanction plans and estimates for improving the 1st Branch channel, Periyar System, the Chief Engineer for Irrigation has the honour to make the following remarks : --

Plan No. 67.—The bottom widths of front returns and wings are not sufficient and may be increased from 3 feet and $3\frac{1}{2}$ feet to $3\frac{1}{2}$ feet and 4 feet respectively.

Plan No. 68.—The side slopes of proposed bank as plotted on longitudinal section of the sluice are 2 : 1 and the front wings have a slope of 1 : 1, while the proper side slopes of banks are $1\frac{1}{2}$: 1. The correct section of bank with side slopes of $1\frac{1}{2}$: 1 now drawn in this office in pencil shows that the proposed length of the sluice is sufficient. The wings will have to be altered to suit the slopes and returns added in rear as they are necessary.

Plan No. 74.—The front wings appear unnecessary and the head wall may be lengthened to admit of cutting the leading channel with necessary side slopes. It is suggested that turfed earth sections may be an efficient and economical substitute for the proposed roughstone grade walls provided at furlong intervals.

2. There is a provision of Rs. 125 for reducing the ventways of sluices above Vadakarai tank in the estimate for repairs. The details of such reduction of ventways have not been given in the tabular statement. These should be furnished so as to make the statement complete.

3. The Superintending Engineer is requested to obtain the Collector's opinion and approval to the proposed improvements and to revise the plans and estimates herewith returned in the light of the above remarks.

H. E. CLERK,
Chief Engineer for Irrigation.

To the Superintending Engineer, VI Circle.

VIII

Letter—from S. B. MURRAY, Esq., Superintending Engineer, VI Circle.
To—the Chief Engineer for Irrigation.
Dated—Trichinopoly, the 3rd May 1912.
No.—516 C.E./679.

With reference to your Memorandum No. R.O.C. 711/10, dated 7th October 1911, I have the honour to resubmit the plans and estimate for improvements and repairs to the 1st Branch channel, Periyar System, revised on the lines suggested in your memorandum quoted above.

2. As regards your proposal to substitute turfed earth sections for the rough-stone grade walls provided at furlong intervals, the Executive Engineer, Madura division, states that the provision made in the estimate should be allowed to stand, as, although it is likely that turf or brush wood earth sections will prove suitable in many parts of the channel, stone section will also be necessary at other places, and the extra provision will allow of increasing the lengths of the turfed or brush wood sections considerably where necessary. I therefore recommend that the provision made in the estimate may remain as it is, and that it be left to the discretion of the Executive Engineer to put up whichever kind of sections he considers suitable.

3. The expression "reducing the ventways of sluices above Vadakarai tank" written in the abstract estimate for repairs to the channel is a clerical error for "sundry repairs to the sluices above Vadakarai tank"; so no alterations need be made in the tabular statement referred to in paragraph 2 of your memorandum under reply.

4. The Collector of Madura has approved of the proposals for the improvements and repairs to the channel—please see the enclosed copy of his letter No. D. Dis. 4023-Rev., dated 21st November 1911, to the Executive Engineer, Madura Division.

Enclosures.

(1)

Letter—from the Acting Collector of Madura.
To—the Executive Engineer, Madura Division.
Dated—the 21st November 1911.
No.—D. Dis. 4023/Rev.

I have the honour to approve of the proposals for the improvements and repairs to No. I Branch Channel, Periyar System, referred to in your letter No. 2058 M., dated 6th November 1911, the enclosures to which are herewith returned.

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(2)

Improvements to First Branch Channel.

Report.

The estimate has been prepared in compliance with Chief Engineer's Memorandum No. R.O.C. 711/10, dated 16th June 1910, communicated with Superintending Engineer's No. 3578 of 3rd July 1910 and provides for improvements to the channel to the extent of Rs. 6,430, and repairs Rs. 6,350 total Rs. 12,780. No. I Branch channel takes off at 7-2-612 of the main canal. It has a masonry head sluice with vent 3′ × 3′ provided with a screw gearing shutter: sill level of sluice + 603·30. Originally the channel was designed to discharge a supply of 72 cusecs with a velocity of 2·41 feet per second. The bed fall was 6 feet per mile and the bed width 12 feet, F.S.L. being 2 feet deep. At 1 mile, 2 furlong 368 feet from the head, the channel joins the old Vadakarai channel, and at one mile 7 furlongs enters the Vadakarai tank which it supplies. From the tank the channel takes off through a masonry sluice and a drop combined and passes through the Vadakarai tank ayacut lands and following a course of 4 miles 0·390 feet terminates in the Thenur Periyakulam tank (see survey plan). Throughout its length the channel is in very bad order indeed. The section is altogether out of proportion to its ayacut, its banks are low and full of cuts, breaches and temporary sluices. Many of the masonry works are in disrepair, some are superfluous and some sluices allow of an excessive discharge. Much difficulty is experienced in supplying portions of the ayacut of the channel as, on account of its excessive section and of the design of the drops, the level at full supply cannot be maintained with the result that cross bunding is frequently resorted to, by the ryots much to the detriment of the channel. The proposed improvements consist mainly in—

(1) Re-designing the section and drops, making the latter trapezoidal instead of rectangular. (2) Providing a regulating inlet at the end of Vadakarai channel. (3) Making the channel altogether independent of the Vadakarai tank, and providing a head sluice through which the tank ayacut can be supplied when necessary, and through which conversely the channel can be supplied when there is an excess of water in the tank. (4) Doing away with all existing temporary pipe sluices in the lower reaches and substituting for them cross channel works by means of which the Vadakarai tank supply, can be passed over or under the channel to irrigate the portion of the tank ayacut proper, cut off by the channel and now commanded with difficulty and much waste, by temporary pipe sluices in the channel banks. Full details of ayacuts, mileages,

bed falls, sections and all hydraulic details are given in the statements accompanying ; so that a description of the works in detail need not be given here, but special reference is necessary to proposals Nos. 1, 2 and 3.

No. 1.—The total ayacut of the channel is 4,492 acres of which 1,221 acres is direct and 3,271 acres indirect or tankfed. The channel was originally designed with F.S.L. of 2 feet to discharge 72 cusecs or a supply for the total area at 60 duty roughly. This design is found to be very uneconomical, because, in the first place 60 duty is too low, and in the second unless F.S.L. or at any rate 1·5 is maintained in the channel, many of the direct ayacut lands cannot be commanded and therefore although the tanks may be full and a supply of $\frac{1221}{60} = 20$ cusecs would suffice in the channel for the direct ayacut, practically full supply level must be maintained. To obviate this waste, the channel and drops are now designed to carry a sufficient supply for the direct ayacut at a duty of 90 (*vide*—Superintending Engineer's No. 193 of 11th January 1910) and an F.S.L. of 1·5 feet. The channel and drops so designed will also carry a supply at the same duty for the whole area direct and indirect at a M.W.L. of 3·5 above bed. Thus when the tankfed lands have their own supply the direct ayacut can be commanded without waste, and when necessary the whole ayacut can be supplied at M.W.L.

No. 2.—The Vadakarai channel tails into No. I Branch channel at mileage 1–2–368 and during the irrigation season there is generally a small quantity of water flowing from it into the branch channel. During floods a surplus supply which at its maximum amounts to 45 cusecs passes down the Vadakarai channel, but this is generally bunded off by the ryots as the Vadakarai tank is usually surplusing when the Vadakarai channel is in flood and this discharge is not required. This bund is liable to burst and cause damage in the Branch channel. It is therefore proposed to build a combined regulating sluice and culvert at the junction. Flood water can thus be kept out of the Branch channel and at the same time a supply to any extent required can be passed in, thus economising canal water. The flood water held up at the regulator will freely surplus over a calingula of 48 feet long at bed level of the channel which is situated 2750 feet up the Vadakarai channel. There is another calingula 60 feet long, 2,516 feet still further up so that the surplus arrangements in the channel are ample. The holding up of water at the regulator will in no way effect either the road or railway culverts which are of ample size. The right bank of the branch channel is the inspection bank, and hence the design of a combined culvert and regulator is adopted. No description need be given of the designs of the small syphons and aqueducts, and a reference to the tabular statement will furnish details of their position and the purpose for which each is intended The syphons are combined surplus and irrigation works and are designed to carry the greater discharge. As mentioned above it will be observed that the section of the channel at present is much in excess of requirements especially in the lower reaches, where in many places the channel as an irrigation channel is practically non-existent. In order to restore the channel to its proper section it is proposed to put in dry stone sections 20 feet long at intervals of 500 or 600 feet as required. These sections are designed at the true section of the channel (a type section is given in the estimate) and will, it is hoped, have the effect of gradually silting in the reaches between them. The sections as plotted do not give a correct idea of the channel as it is, as miles of it are overgrown with reeds which will be preserved to assist the process of silting. The banks will be made up to 2 feet above M.W.L. The right or inspection bank will have a top width of 5 feet and will be gravelled to a width of 4 feet with 4 inches of gravel, as the soil is weak. Spoil for the banks must be obtained from the fields and compensation for temporary occupation is provided in the estimate. The width of Government land is sufficient throughout, and no new land need be acquired. A statement of the widths occupied by the channel is enclosed. The estimate is a large one, and it may be questioned whether the expenditure is justified, as no increase of revenue will result. There is no possibility of any appreciable extension under the channel, but the saving of the waste which now goes on in this important channel will be a sensible asset to the Main Canal supply and will thus indirectly lead to extension elsewhere. The estimate is therefore strongly recommended for sanction at an early date. The rates for the work are fair for the locality, and data sheets are attached. Hydraulic calculations for each reach of the channel and for the drops are appended. Work will be carried out according to standard specifications.

No. 3.—At present the channel flows into Vadakarai tank at about 1 mile 7 furlongs. This is a most unsatisfactory and wasteful arrangement. In order to irrigate the channel ayacut below the Vadakarai tank sluice, canal water has to be passed into the tank and is dissipated and wasted through the other tank sluices. The F.T.L. of the tank is + 578·96 and thus the channel up to Drop No. IV is virtually tank bed and has become much silted up and injured the sluices in the reach being buried as much as 3′ in silt. The head sluice in the tank which supplies the lower portion of the channel is frequently interfered with by the ryots holding lands in the tank ayacut with the object of keeping up water in the tank and this results in much complaint and loss to the ryots who depend on the channel. It has moreover been decided by the Chief Engineer that the Vadakarai tank should not be filled up with Periyar water at any time of the year. It is therefore proposed to continue the left bank of the channel from 1 mile 7 furlongs to the tank sluice, thus separating the channel from the tank bed, and to form a channel of the required section with an uniform bed fall from the lower sill of Drop No. 4 to the sill of the sluice. This works out to 1 in 880 feet or 6 feet per mile (*vide* survey and sections).

A head sluice will be built in the left bank of the channel by means of which water can be supplied to the tank ayacut when required. The M.W.L. in the channel at the site of this sluice is + 571·74 which is 6·22 below F.T.L. of the tank. The tank will therefore be independent of the channel till its level falls to a point where practically direct irrigation of its ayacut by channel water is necessary and the sluice may be opened. This permits of a very considerable economy of canal water. The tank has a catchment of 25 sq. miles as well as an involuntary supply from No. II Branch channel and receives a very good supply throughout the season, so much so that F.T.L. is rarely maintained as the ryots do not think it necessary to turf the calingula. When there is a good supply in the tank the whole of the ayacut below drop No. 4 can be supplied through this head sluice as heretofore and shutters which will be provided at Drop No. 4 can be closed leaving only 371 acres in the upper 4 reaches to be supplied by canal water. The deepening of the channel bed from Drop No. IV to the Drop No. V entails the lowering of three pipe sluices. Under Nos. 1 and 2 an area of 2 to 3 acres of high land will be effected by this at F.S.L., but the extent is negligible and if the owners desire to cultivate they can do so after lowering the lands about 6 inches.

J. M. M. Parker,
Executive Engineer, Madura Divn.

28th February 1911.

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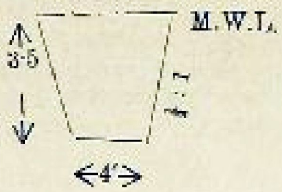
(3)

Hydraulic calculations of the first branch channel as now proposed, using Kutter's coefficient and taking the value N = as ·0225.

Data: N = ·0225. S = 1 in 880 or ·001136.
Bed width = 4 ft., Side slope ½ to 1 (assumed).
F.S.L. = 1·5 ft.—M.W.L. = 3·5 ft.



$$D = AV \qquad A = 20{\cdot}12$$
$$V = C\sqrt{RS} \qquad B = 11{\cdot}84$$
$$\sqrt{S} = {\cdot}0337 \qquad R = 1{\cdot}7, \quad \sqrt{r} = 1{\cdot}3$$

Kutter's coefficient :—

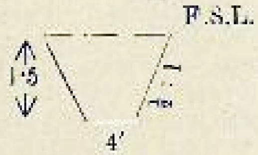
$$C = \frac{41{\cdot}6 + \dfrac{1{\cdot}811}{{\cdot}0225} + \dfrac{{\cdot}00281}{{\cdot}001136}}{1 + \left(41{\cdot}6 + \dfrac{{\cdot}00281}{{\cdot}001136}\right)\dfrac{{\cdot}0225}{1{\cdot}3}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}50 + 2{\cdot}47}{1 + (41{\cdot}6 + 2{\cdot}47) \times {\cdot}0173}$$

$$= \frac{124{\cdot}57}{1 + (44{\cdot}07) \times {\cdot}0173} = \frac{124{\cdot}57}{1{\cdot}76}$$

$$= 70{\cdot}77$$

$$V = 70{\cdot}77 \times 1{\cdot}3 \times {\cdot}0337 = 3{\cdot}1 \text{ ft. per second.}$$
$$Q = AV = 20{\cdot}12 \times 3{\cdot}1 = 62{\cdot}37 \text{ cusecs.}$$



A = 7·125 sq. ft.
B = 7·36 feet.
R = ·96, $\sqrt{r}$ = ·97.

$$C = \frac{41{\cdot}6 + \dfrac{1{\cdot}811}{N} + \dfrac{{\cdot}00281}{S}}{1 + \left(41{\cdot}6 + \dfrac{{\cdot}00281}{S}\right)\dfrac{N}{\sqrt{r}}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}50 + 2{\cdot}47.}{1 + (41{\cdot}60 + 2{\cdot}47)\dfrac{{\cdot}0225}{{\cdot}97}}$$

$$= \frac{144{\cdot}57}{1 + (44{\cdot}07 \times {\cdot}0232)} = \frac{144{\cdot}57}{1 + 1{\cdot}022}$$

$$= \frac{144{\cdot}57}{2{\cdot}022} = 71{\cdot}50$$

$V = 71 \cdot 5 \times \cdot 97 \times \cdot 0337 = \underline{\underline{2 \cdot 33}}$ ft. per second.

$Q = A\,V = 7 \cdot 125 \times 2 \cdot 33 = \underline{\underline{16 \cdot 60}}$ cusecs.

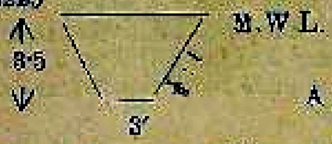
Second reach = Same as I reach.

Third reach :—

Bed width = 3′, Bed fall 1 in 880 or ·001136.

Side slopes = $\frac{1}{2}$ to 1 (assumed), F.S.L. = 1·5′, M.W.L. = 3·5 ft.

N = ·0225



A = 16·62 sq. feet.

$B = 10 \cdot 84,\ R = 1 \cdot 53\ \sqrt{r} = 1 \cdot 23.$

$S = 1$ in 880 or $\cdot 001136,\ \sqrt{s} = \cdot 0337.$

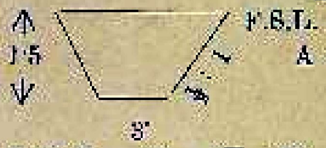
$$C = \frac{41 \cdot 6 + \frac{1 \cdot 811}{\cdot 0225} + \frac{\cdot 00281}{\cdot 001136}}{1 + \left(41 \cdot 6 + \frac{\cdot 00281}{\cdot 001136}\right)\frac{N}{\sqrt{r}}}$$

$$= \frac{41 \cdot 60 + 80 \cdot 50 + 2 \cdot 47}{1 + (41 \cdot 60 + 2 \cdot 47)\frac{\cdot 0225}{1 \cdot 23}}$$

$$= \frac{124 \cdot 57}{1 + (44 \cdot 07) \times \cdot 0183} = \frac{124 \cdot 57}{1 \cdot 806} = \underline{\underline{68 \cdot 97}}.$$

$V = 68 \cdot 97 \times 1 \cdot 23 \times \cdot 0337 = \underline{\underline{2 \cdot 85}}$ feet per second.

$Q = A\,V = 16 \cdot 62 \times 2 \cdot 85 = \underline{\underline{47 \cdot 36}}$ cusecs.



A = 5·62 sq. feet.

$B = 6 \cdot 36,\ R = \cdot 88,\ \sqrt{r} = \cdot 93.$

$$C = \frac{41 \cdot 60 + \frac{1 \cdot 811}{N} + \frac{\cdot 00281}{S}}{1 + \left(41 \cdot 60 + \frac{\cdot 00281}{S}\right)\frac{N}{\sqrt{r}}}$$

$$= \frac{41 \cdot 60 + 80 \cdot 48 + 2 \cdot 47}{1 + (41 \cdot 60 + 2 \cdot 47)\, \cdot 0242.}$$

$$= \frac{124 \cdot 55}{1 + (44 \cdot 07) \times \cdot 0242} = \frac{124 \cdot 65}{1 + 1 \cdot 066} = \underline{60 \cdot 28}.$$

$V = 60 \cdot 28 \times \cdot 93 \times \cdot 0337 = \underline{1 \cdot 89}$ feet per second.

$Q = A\,V = 5 \cdot 62 \times 1 \cdot 89 = \underline{\underline{10 \cdot 62}}$ cusecs

Fourth and fifth reaches same as the third reach.

Sixth reach :—

Bed width = $2\frac{1}{2}$ feet, bed fall = 1 in 1,000.

Side slopes $\frac{1}{2}$ to 1 assumed, F.S.L. = 1·5,′ M.W.L. = 2·75 ft.

N = ·0225.

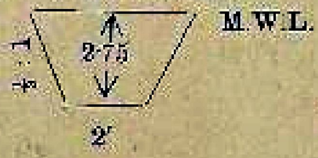
Discharge at = { F.S.L. 8·38 cusecs.
M.W.L. 24·38 cusecs.

Seventh reach :—

Bed width = 2 feet, bed fall 1 in 880 or ·001136.

Side slopes $\frac{1}{2}$ to 1 assumed, F.S.L. = 1·5, M.W.L. = 2·75 ft.

N = ·0225 , $\sqrt{s} = \cdot 0337.$



A = 9·28 sq. feet.

$B = 8{\cdot}16 \quad R = 1{\cdot}13, \ \sqrt{r} = 1{\cdot}07.$

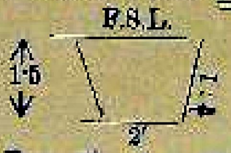
$$C = \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}47.}{1 + (41{\cdot}60 + 2{\cdot}47)\dfrac{N}{\sqrt{r}}}$$

$$= \frac{124{\cdot}55}{1 + (44{\cdot}07 \times {\cdot}021)}$$

$$= \frac{124{\cdot}55}{1 + 0{\cdot}92} = \underline{\underline{64{\cdot}87.}}$$

$V = 64{\cdot}87 \times 1{\cdot}07 \times {\cdot}0337 = 2{\cdot}32$ feet per second.

$Q = A\,V = 9{\cdot}28 \times 2{\cdot}32 = \underline{\underline{21{\cdot}55}}$ cusecs.



A = 4·12 sq. ft.

$B = 5{\cdot}36, \ R = {\cdot}77, \ \sqrt{r} = {\cdot}87.$

$$C = \frac{41{\cdot}6 + \dfrac{1{\cdot}811}{N} + \dfrac{{\cdot}00281}{S}}{1 + \left(41{\cdot}6 + \dfrac{{\cdot}00281}{S}\right)\dfrac{N}{\sqrt{r}}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}47}{1 + (41{\cdot}6 + 2{\cdot}47) \times {\cdot}0258}$$

$$= \frac{124{\cdot}56}{1 + 44{\cdot}07 \times {\cdot}0258}$$

$$= \frac{124{\cdot}650}{1 + 1{\cdot}137} = \frac{124{\cdot}550}{2{\cdot}137}$$

$$= \underline{\underline{58{\cdot}2}}$$

$V = C\sqrt{r}\ \sqrt{s}, = 58{\cdot}3 \times {\cdot}87 \times {\cdot}0037 = 1{\cdot}71$ feet per second.

$Q = Av = 4{\cdot}12 \times 1{\cdot}71 = \underline{7{\cdot}04}$ cusecs.

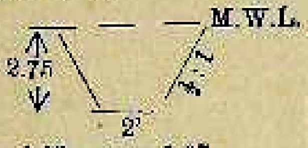
Eighth reach = Same as the seventh reach.

Ninth reach :—

Bed width = 2', Bedfall 1 in 1466 or ·00066

Side slopes = ½ to 1 (assumed), F.S.L. = 1·5, M.W.L. = 2·75 ft.

$N = {\cdot}0225, \ \sqrt{s} = {\cdot}0257$



A = 9·28 sq. ft.

$B = 8{\cdot}15, \ R = 1{\cdot}13, \ \sqrt{r} = 1{\cdot}07$

$$C = \frac{41{\cdot}6 + \dfrac{1{\cdot}811}{N} + \dfrac{{\cdot}00281}{S}}{1 + \left(41{\cdot}6 + \dfrac{{\cdot}00281}{S}\right)\dfrac{N}{\sqrt{r}}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}58 + 4{\cdot}25}{1 + (41{\cdot}6 + 4{\cdot}25)\dfrac{{\cdot}0225}{1{\cdot}07}} = \frac{126{\cdot}33}{1 + 0{\cdot}97} = 64{\cdot}12$$

$V = C\sqrt{r}\ \sqrt{s} = 64{\cdot}12 \times 1{\cdot}07 \times {\cdot}026 = \underline{\underline{1{\cdot}78}}$ ft. per second.

$Q = AV = 9{\cdot}28 \times 1{\cdot}78 = \underline{\underline{16{\cdot}61}}$ cusecs.

A = 4·12 s. ft.

$B = 5{\cdot}36 \text{ ft. } R = {\cdot}77, \ \sqrt{r} = 1{\cdot}7$

$$C = \frac{41{\cdot}60 + \dfrac{1{\cdot}811}{N} + \dfrac{{\cdot}00281}{S}}{1 + \left(41{\cdot}60 + \dfrac{{\cdot}00281}{S}\right)\dfrac{N}{\sqrt{r}}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}48 + 4{\cdot}25}{1 + (41{\cdot}60 + 4{\cdot}25) \times {\cdot}0258}$$

$$= \frac{126{\cdot}33}{1+1{\cdot}18} = \frac{126{\cdot}33}{2{\cdot}18} = \underline{\underline{57{\cdot}95}}$$

$V = C \times \sqrt{r} \times \sqrt{s} = 57{\cdot}95 \times {\cdot}87 \times {\cdot}0257 = \underline{\underline{1{\cdot}3}}$ ft. per second.

$Q = AV = 4{\cdot}12 \times 1{\cdot}3 = \underline{\underline{6{\cdot}85}}$ cusecs.

Tenth reach—

Bed width = 2 ft. Bedfall 1 in 828 or ·00125

Side slopes ½ to 1 assumed, F.S.L. = 1·5, M.W.L. = 2·75

$N = {\cdot}0225$, $\sqrt{s} = {\cdot}0347$

A at M.W.L. = 9·28 sq. ft.

$B = 8{\cdot}15$, $R = 1{\cdot}13$, $\sqrt{r} = 1{\cdot}07$

$$C = \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}248}{1 + (41{\cdot}60 + 2{\cdot}248) \times {\cdot}021}$$

$$= \frac{124{\cdot}328}{1+0{\cdot}92} = \underline{\underline{64{\cdot}75}}$$

$V = C\sqrt{r} \times \sqrt{s} = 64{\cdot}75 \times 1{\cdot}07 \times {\cdot}034 = \underline{\underline{2{\cdot}36}}$ ft. per second.

$Q = AV = 9{\cdot}28 \times 2{\cdot}36 = 21{\cdot}90$ cusecs.

A at F.S.L. = 4·12 sq. ft., B = 5·36

$R = {\cdot}77$, $\sqrt{r} = {\cdot}87$

$$C = \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}248}{1 + (41{\cdot}60 + 2{\cdot}248) \times {\cdot}0258} = \frac{124{\cdot}328}{1+1{\cdot}131} = 58{\cdot}34.$$

$V = C\sqrt{r} \times \sqrt{s} = 58{\cdot}34 \times {\cdot}87 \times {\cdot}0347 = \underline{\underline{1{\cdot}76}}$ ft. per second.

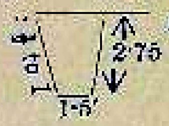
$Q = AV = 4{\cdot}12 \times 1{\cdot}76 = \underline{\underline{7{\cdot}25}}$ cusecs.

Eleventh reach —

Bed width = 1½ ft. Bed fall 1 in 711 or ·00140.

Side slopes ½ to 1. (assumed), F.S.L. = 1·5 ft., M.W.L. = 2·75 ft.

$N = {\cdot}0225$, $\sqrt{s} = {\cdot}0375$.



M.W.L. A = 7·89 s.ft.

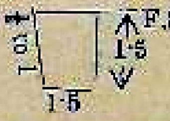
$B = 7{\cdot}66$, $R = 1{\cdot}02$, $\sqrt{r} = 1{\cdot}00$.

$$C = \frac{41{\cdot}6 + \frac{1{\cdot}811}{N} + \frac{{\cdot}00281}{S}}{1 + \left(41{\cdot}6 + \frac{{\cdot}00281}{S}\right)\frac{N}{\sqrt{r}}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}00}{1 + (41{\cdot}6 + 2{\cdot}00)\frac{{\cdot}0225}{1{\cdot}00}} = \frac{124{\cdot}08}{1{\cdot}98} = 62{\cdot}67.$$

$V = C\sqrt{rs} = 62{\cdot}67 \times 1 \times {\cdot}0375 = \underline{\underline{2{\cdot}35}}$ ft. per second.

$Q = AV = 7{\cdot}89 \times 2{\cdot}35 = \underline{\underline{18{\cdot}54}}$ cusecs.



F.S.L. A = 3·37 s. ft.

$B = 4{\cdot}86$ ft. $R = {\cdot}69$, $\sqrt{r} = {\cdot}83$.

$$C = \frac{41{\cdot}6 + \frac{1{\cdot}811}{{\cdot}0225} + \frac{{\cdot}00281}{{\cdot}00140}}{1 + \left(41{\cdot}6 + \frac{{\cdot}00281}{{\cdot}00140}\right)\frac{{\cdot}0225}{{\cdot}83}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}00}{1 + (41{\cdot}6 + 2{\cdot}00)\,{\cdot}0271} = \frac{124{\cdot}08}{1 + 1{\cdot}18}$$

$$= \frac{124{\cdot}08}{2{\cdot}18} = 56{\cdot}91$$

$V = C\sqrt{rs} = 56{\cdot}91 \times {\cdot}83 \times {\cdot}0375 = 1{\cdot}77$ feet per second.

$Q = AV = 3{\cdot}37 \times 1{\cdot}77 = 5{\cdot}96$ cusecs.

Twelfth reach—

Bed width = 1′-6″. Bed fall 1 in 832 or ·00120.

Side slopes ½ to 1 (assumed), F.S.L. = 1·5, M.W.L. = 2·75 feet.

$N = {\cdot}0225,\ \sqrt{s} = {\cdot}0347.$

A at M.W.L. = 7·89 s.ft.

$B = 7{\cdot}66$ ft, $R = 1{\cdot}02,\ \sqrt{r} = 1{\cdot}00.$

$$C = \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}34.}{1 + (41{\cdot}60 + 2{\cdot}34\Big)\frac{{\cdot}0225}{1{\cdot}00}}$$

$$= \frac{124{\cdot}42}{1 + {\cdot}98} = \frac{124{\cdot}42}{1{\cdot}98} = \underline{62{\cdot}83.}$$

$V = C\sqrt{rs} = 62{\cdot}83 \times 1 \times {\cdot}0347 = 2{\cdot}18$ feet per second.

$Q = AV = 7{\cdot}89 \times 2{\cdot}18 = \underline{17{\cdot}20}$ cusecs.

A at F.S L. = 3·37.

$B = 4{\cdot}86,\ R = {\cdot}69\ \sqrt{r} = {\cdot}83$

$$C = \frac{41.60 + 80{\cdot}48 + 2{\cdot}34}{1 + (41{\cdot}6 + 2{\cdot}34)\ {\cdot}0271}$$

$$C = \frac{124{\cdot}42}{1 + 1{\cdot}19} = \frac{124{\cdot}42}{2{\cdot}19} = 56{\cdot}81$$

$V = C\sqrt{rs} = 56{\cdot}81 \times {\cdot}83 \times {\cdot}0347 = 1{\cdot}64$ feet per second.

$Q = A\,V = 3{\cdot}37 \times 1{\cdot}64 = 5{\cdot}52$ cusecs.

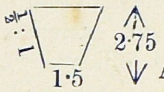
Thirteenth reach—

Bed width = $1\frac{1}{2}$ feet, Bed fall 1 in 909, or ·00110.

Side slopes ½ to 1 (assumed), F.S.L. = 1·5, M.W.L. = 2·75 feet.

$N = {\cdot}0225,\ \sqrt{s} = {\cdot}0331$

M.W.L.



A = 7·89 sq. feet.

$B = 7{\cdot}66,\ R = 1{\cdot}02,\ \sqrt{r} = 1{\cdot}00$

$$C = \frac{41{\cdot}60 + \frac{1{\cdot}811}{N} + \frac{{\cdot}00281}{S}}{1 + \left(41{\cdot}6 + \frac{{\cdot}00281}{S}\right)\frac{N}{\sqrt{r}}}$$

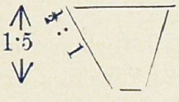
$$= \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}55}{1 + (41{\cdot}60 + 2{\cdot}55)\ {\cdot}0225}$$

$$= \frac{124{\cdot}63}{1 + {\cdot}99} = \frac{124{\cdot}63}{1{\cdot}99} = \underline{62{\cdot}62}$$

$V = C\sqrt{rs} = 62{\cdot}62 \times 1 \times {\cdot}0331 = 20{\cdot}72$ feet per second.

$Q = A\,V = 7{\cdot}89 \times 2{\cdot}072 = \underline{16{\cdot}34}$ cusecs.

F.S.L.



A = 3·37 sq. feet.

1·5

$B = 4{\cdot}86,\ R = {\cdot}69,\ \sqrt{r} = {\cdot}83$

$$C = \frac{41{\cdot}6 + \frac{1{\cdot}811}{N} + \frac{{\cdot}00281}{S}}{1 + \left(41{\cdot}6 + \frac{{\cdot}00281}{S}\right)\frac{N}{\sqrt{r}}}$$

$$= \frac{41{\cdot}60 + 80{\cdot}48 + 2{\cdot}55}{1 + (41{\cdot}60 + 2{\cdot}55)\ {\cdot}0271}$$

$$= \frac{124{\cdot}63}{1 + 1{\cdot}19} = \frac{124{\cdot}63}{2{\cdot}19} = 56{\cdot}90$$

$V = C\sqrt{rs} = 56{\cdot}90 \times {\cdot}83 \times {\cdot}0331 = 1{\cdot}56$ feet per second.

$Q = AV = 3{\cdot}37 \times 1{\cdot}56 = \underline{5{\cdot}25}$ cusecs.

Sample form.

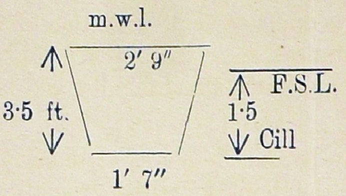
Hydraulic calculations of the drops in the First Branch Channel.

Using M. Nethersole's discharge tables.

Drop No. I. at F. S. L.—

	CUSECS.
Discharge required	= 12·10
do. provided	= 12·32

Formula used $5{\cdot}35 \times C \sqrt{d}\,[b\,(d) + n\,({\cdot}4\,d^2)]$



Discharge at M.W.L.
24·5 × 1·583 = 38·38

As per page 18 :

	CILL WIDTH	CUSECS.
Discharge over cill width for a depth of 1·5 feet	·1 =	0·69
∴ ∴	1·00 =	6·9
Discharge over cill width for a depth of 1·5 feet	1·583 =	6·9 × 1·583.
Triangular portions of	=	10·92 cusecs.
Discharge through notches as per page 16 for a side slope triangular $\frac{1}{6}$ to 1 and for depth of $1\frac{1}{2}$,′ (F.S.L.)	=	1·40
Total discharge through the notch	=	12·32 cusecs.

11·40
cusecs. 49·78

IX

Note by the Chief Engineer for Irrigation, R.O.C. No. 711/10, dated 11th July 1912.

In his inspection notes of February 1910, the Superintending Engineer, VI Circle, reported that No. 1 Branch channel of the Periyār system was in bad order and that it should be resluiced and repaired. In this office R.O.C. No. 711/10, dated 16th June 1910, the Superintending Engineer was requested to prepare and submit the necessary estimate for putting the branch channel No. 1 above and below the Vadakarai tank, in proper order. With his letter No. 798 C.E., dated 22nd July 1911, the Superintending Engineer, VI Circle, submitted two estimates one amounting to Rs. 6,400 for improvements and the other for Rs. 6,350 for necessary repairs to No. 1 Branch channel of the Periyār system. In this office R.O.C. No. 711/10, dated 7th October 1911, the papers were returned to the Superintending Engineer for revision of some of the designs of masonry works and also for obtaining the Collector's opinion and approval to the proposed improvements. With his letter No. 516 C.E., dated 3rd May 1912, the Superintending Engineer now resubmits the estimates duly revised together with a copy of the Collector's letter No. D.Dis. 4023-Rev. of 1911, dated 21st November 1911, approving the proposed improvements and repairs.

2. No. 1 Branch channel takes off at about 7 miles 3 furlongs of the Periyār main canal, joins the old Vadakarai channel at 1 mile $2\frac{1}{2}$ furlongs and enters the Vadakarai tank at 1 mile 7 furlongs. It takes off again from the tank through a sluice and passes through the ayacut of the Vadakarai tank and at 4 miles 390 feet terminates in the Thenur-Periyakulam tank. It directly irrigates 1,221 acres besides supplying 3,271 acres under tanks. It is stated that the present section of the channel is out of proportion to its ayacut and its banks are low and full of cuts and breaches with temporary sluices and that much difficulty is experienced in supplying portions of the ayacut as full supply cannot be maintained, with the result that cross bunding is frequently resorted to by the ryots much to the detriment of the channel. The improvements consist of—

(1) Remodelling the section of the channel,
(2) Converting the existing rectangular drops into trapezoidal notches,
(3) Providing a combined culvert and regulator at the junction of old Vadakarai channel,

(4) Making the channel altogether independent of the Vadakarai tank by raising the left bank of the channel between C.S. Nos. 28 and 43 (*i.e.*, 1 mile $3\frac{1}{2}$ furlongs to 2 miles 4 furlongs) to 5 feet above tank F.T.L. with 6 feet top width and slopes $1\frac{1}{2}$ to 1 and providing a masonry sluice at 2 miles 3 furlongs 640 feet or about 20 feet above the present combined head sluice and drop, so as to enable the channel to supply the ayacut of the tank when necessary and to draw off from the tank when there is surplus water available in it, and.

(5) Doing away with all existing temporary pipe sluices in the lower reaches and substituting for them syphons and aqueducts so as to pass the tank supply over or under the channel according to circumstances, to irrigate the portion of the tank ayacut cut off by the channel and now commanded with difficulty and much waste by temporary sluices in the channel banks.

The channel and drops are proposed to be remodelled so as to carry the required supply, with a depth of $1\frac{1}{2}$ feet at F.S.L. throughout for direct irrigation with a duty of 90, and with a depth of $3\frac{1}{2}$ feet at M.W.L., from head down to 2 miles 4 furlongs, and a depth of $2\frac{3}{4}$ feet below 2 miles 4 furlongs down to the end will carry a sufficient supply at the same duty for the whole area direct and indirect.

Provision is also made in the estimate for constructing 33 roughstone grade walls along the channel wherever its present section is much in excess of requirements so as to restore the channel to its proper section. The estimate for improvements, as detailed below, amounts to Rs. 6,130, which is recommended for sanction:—

	RS.
(*a*) Constructing a combined culvert and regulator on the right bank of No. 1 Branch channel where the old Vadakarai channel joins it.	520
(*b*) Constructing six pipe sluices	1,425
(*c*) Constructing a masonry sluice in the left bank at 2 miles 3 furlongs 640 feet for the supply of Vadakarai tank	990
(*d*) Constructing three under-tunnels and three iron pipe aqueducts where irrigation channels from the tank cross the channel ..	2,025
(*e*) Improving the regulator at 6 miles 4 furlongs 390 feet and providing pipe sluices on both sides	240
(*f*) Converting 12 existing rectangular drops into trapezoidal notches	300
(*g*) Constructing 33 roughstone grade walls along the channel ..	930
Total ..	6,130

It is suggested that turfed earth or brushwood sections may be efficient and economical substitutes for the proposed roughstone grade walls provided at furlong intervals, but it may be left to the Executive Engineer's discretion to put whichever kind of section he considers suitable during the execution of the work.

3. The estimate for repairs provides for clearing silt in the channel and raising its banks where necessary and also for carrying out sundry repairs to existing masonry works. This estimate may be returned to the Superintending Engineer to be dealt with by himself being within his powers of sanction. His attention may, however, be drawn to the following remarks:—

(i) It is stated in the report that a margin of 2 feet above M.W.L. has been allowed for the banks throughout, whereas the cross sections between $2\frac{1}{2}$ and $7\frac{1}{4}$ miles show the margin to be $2\frac{1}{4}$ feet above M.W.L.; 2 feet margin throughout is considered sufficient.

(ii) A provision of Rs. 535 has been allowed for temporary occupation of land for obtaining the required earth for banking. The Superintending Engineer should, before the work is put in hand, ascertain if any permanent occupation of land is necessary.

4. The Accountant-General may be requested to write back from the Capital to the Revenue Account of the Periyār system, the sum of Rs. 1,040 referred to in paragraph 3 of the Superintending Engineer's letter No. 798 C.E., dated 22nd July 1911, read above.

H. E. CLERK,
Chief Engineer for Irrigation.

To the Secretary to Government, Public Works Department
(General and Irrigation).

Order—No. 274 I., dated 25th July 1912.

The following estimate is sanctioned :—

Imperial.

Capital expenditure not charged to Revenue.

49. Irrigation.

Periyar System.

Open Capital Account.

I. Works.

2. Main Canals and Branches.

C. Works

Unremunerative Work.

Improvements to No. 1 Branch channel.

Estimate—

	RS.
I. Works	6,430
II. Establishment	1,479
Total ...	7,909

2. This sanction is registered as No. 37-I. of 1912-13 and will expire on the 31st March 1913.

3. The attention of the Superintending Engineer, VI Circle, is drawn to paragraphs 2 and 3 of the foregoing note by the Chief Engineer for Irrigation and that of the Accountant-General to paragraph 4 thereof.

(True Extract.)

H. E. CLERK,
Ag. Secretary to Govt., P.W.D.
(General and Irrigation).

To the Chief Engineer for Irrigation.
,, Superintending Engineer, VI Circle, with plans and estimates including those connected with repairs.
,, Accountant-General, Madras.

Forwarded to the

(By Order.)

Ag. Deputy Registrar.

PUBLIC WORKS DEPARTMENT
(IRRIGATION BRANCH).

NOTES CONNECTED WITH G.O. No. 274 I., DATED 26TH JULY 1912.

[SUBJECT.—*Estimate of Rs. 7,909 inclusive of establishment charges for certain improvements to No. 1 Branch channel of Periyar System.*]

Note by the Chief Engineer for Irrigation, B.O.C. No. 711/10, dated 11th July 1912.

Under Secretary—

Deputy Secretary—

A draft order sanctioning the estimate is submitted and may, if approved, be circulated to the Honourable Member.

2. The necessity for the proposed improvements is explained in detail in the Chief Engineer for Irrigation's note quoted above.

T.S.R.—9-7-12.

M.S.V.—9-7-12.

F. E. MORGAN—11-7-12.

Honourable Member—

D. MARSHALL—11-7-12.

H. A. S[TUART]—12-7-12.

Under Secretary—

The draft order may now issue.

M.S.—12-7-12.

B.G.R.—12-7-12.

Issue.

F.E.M.—13-7-12.

[Issued as G.O. No. 274 I., dated 26th July 1912.]

From the S.E, VI Circle, dy 15. 2.10, No 192 CE
To — do — , dy 7-4-10, Roc No 711/10
From — do — , dy 29.5.10, No 545CE
To — do — , dy 16.6.10, Roc No 711/10
Reminder to do — dy 2.9.10
From — do — dy 1.10.10, No 994CE
Reminder to do — dy 16.12.10
From — do — dy 16.1.11, No 59CE
Reminder to do — dy May 1911
From — do — dy 22.5.11, No 554CE
From — do — dy 22.7.11, No 798CE
To — do — dy 7.10.11, Roc No 711/10
From — do — dy 13.5.12, No 516CE
628.

Print. Quote [2 & 8]. Print.

Print Report + hydraulic calculations also

E.I's Office.

Note by the Chief Engineer for Irrigation. Roc No 711/10 dy 11.7.12

In 1 cb 2 Est. 31 file 34

pages 8 & 9 of cur file

31. P

CURRENT No. 10231
PASSED ON BY
R. C. 22/7
J. R. C.
REF.
R. K
D. O

In his Inspection notes of February 1910, the Supg. Engineer VI Circle, - reported that No.1 Branch channel of the Periyar system was in bad order and that it should be resluiced and repaired. In this office R.O.C.No.711 of 1910, dated 16th June 1910, the Supg. Engineer was requested to prepare and submit the necessary estimate for putting the branch channel No.1 above and below the Vadagarai tank, in proper order. With his letter No.798 C.E., dated 22nd July 1911, the Superintending Engineer, VI Circle, submitted 2 estimates one amount--ing to Rs. 6,400 for improvements and the other for Rs. 6,350 for necessary -- repairs to No.1 Branch channel of the Periyar system. In this office R.O.C., No. 711 of 1910 dated 7th October 1911 the

page 12 of cur file

page 16 of cur file

pages 18 & 19 of cur file

42

the papers were returned to the Supg. Engineer for revision of some of the designs of masonry works and also ~~to~~ for obtaining the Collector's opinion and -- approval to the proposed improvements. With his letter No. 516 C.E., dated 3rd May 1912, the Supg. Engineer now resubmits the estimates duly revised together - with a copy of the Collector's letter No. D.Dis.4023/Rev of 1911 dated 21st November 1911, approving the proposed - improvements and repairs.

2. No.1 branch channel takes off at about 7 miles 3 fur of the Periyar main canal and enters the Vadagarai tank at 1 mile 7 furlongs ~~after~~ ~~jo~~ joining the old Vadagarai channel at 1 mile 2½ fur: It takes off again from the tank through a sluice and passes - through the ayacut ~~lands~~ of the Vadagarai tank and ~~finally~~ at 4 miles 390 ft terminates in the Thenur Periyakulam tank ~~after a course of 4 miles 390 feet~~. It ~~has a~~ directly irrigates ~~of~~ 1221 acres -- besides

43 33.0

besides supplying 3271 acres under tanks. It is stated that the present section of the channel is out of proportion to its ayacut and its banks are low and full of cuts and breaches with temporary sluices and that much difficulty is experienced in supplying portions of the ayacut as full supply cannot be maintained, with the result that cross bunding is frequently resorted to by the ryots much to the detriment of the channel. The improvements consist of

(1) Remodelling the section of the channel.

(2) Converting the existing rectangular drops into trapezoidal notches.

(3) Providing a combined culvert and regulator at the junction of old Vadagarai channel.

(4) Making the channel altogether independent of the Vadagarai tank by raising the left bank of the channel between C.S.Nos 28 & 43 (2m-5f-2m-6) to 5 ft above Tank F.T.L. with 6' top width and slopes $1\frac{1}{2}$ to 1 and providing a masonry sluice at 2m-3 fur. 640 ft or about 20 ft above the present combined head sluice and drop, so as to enable the channel to supply the

36

224

the ayacut of the tank when necessary and to draw ~~supply~~ off from the tank when there is ~~excess of~~ surplus water available in it, and

(5) doing away with all existing temporary pipe sluices in the lower reaches and substituting for them syphons and aqueducts so as to pass the tank supply over or under the channel according to circumstances, to irrigate the portion of the tank ayacut cut off by the channel and now commanded with difficulty and much waste by temporary sluices in the channel banks.

The channel and drops are proposed to be remodelled so as to carry the required supply, with a depth of 1½ ft at F.S.L. throughout, for direct irrigation with a duty of 90, ~~The same channel~~ and with a depth of 3½ ft at M.W.L., from head down to 2 miles 4 fur., and a depth of 2¾ ft below 2 miles 4 fur. down to the end ~~would~~ will carry a sufficient supply at the same duty for the whole area direct and indirect. ~~without any waste of water.~~

Provision is also made in the estimate for constructing 33 roughstone grade walls along the channel wherever its present section is much in excess of

of requirements so as to restore to its proper section. The estimate as detailed below amounts to Rs. 6,430 which is recommended for sanction.

(a) Constructing a combined culvert and regulator on the right bank of No.1 branch channel where the old Vadagarai channel joins it. 520

(b) Constructing 6 pipe sluices 1,425

(c) ,, a masonry sluice in the left bank at 2m-3f-640ft for the supply of Vadagari tank ~~and to draw supply from it when the tank is full.~~ .. 990

(d) Constructing 3 under tunnels and 3 iron pipe aqueducts where irrigation channels from the tank cross the channel. .. 2,025

(e) Improving the regulator at - 6m-4f-390ft and providing pipe sluices on both sides. .. 240

(f) Converting 12 existing rectangular drops into trapezoidal notches. 300

(g) Constructing 33 roughstone grade walls along the channel 930

Total Rs.	6,430

It is suggested that turfed ~~or brushwood~~

~~brushwood~~ earth [or brushwood] sections may be an efficient and economical substitute for the proposed roughstone grade walls ~~allowed~~ [provided] at ~~a~~ furlong intervals but it may be left to the Executive Engineer's di~~rec~~[scre]tion to put whichever kind of section he considers suitable during the execution of the work.

3. The estimate for repairs provides for clearing silt in the channel and raising its banks where necessary and also for carrying out sundry repairs to existing masonry works. ~~along the channel~~

This estimate ~~will~~ [may] be returned to the Superintending Engineer to be dealt with by himself, being within his powers of sanction. His attention ~~will~~, [may however] be drawn to the following remarks:—

(i) It is stated in the report that a margin of 2 ft above M.W.L. has been allowed for the banks throughout whereas the cross sections between 2½ and 7½ miles show the margin to be 2½ ft above M.W.L.;

2 ft

2 ft margin throughout is considered sufficient.

(ii) A provision of Rs.538 has been allowed for temporary occupation of land for ~~taking the~~ obtaining the required earth for banking. The Supg. Engineer should, before the work is put in hand, ascertain if any permanent occupation of land is necessary.

4. The A.G may be requested to write back from the Capital to the Revue Acct of the Rorija[?] System, the sum of Rs 1040 referred to in para 3 of the S.E's letter No 788 C.E. d/22.7.1[?] read above.

To

The Secy to Govt, P.W.D.
(General & Irrigation)
with the current file.

PUBLIC WORKS DEPARTMENT,

IRRIGATION BRANCH.

Tabling Abstract.

No 1 Branch Channel, Koryar System, Madura Dt.

Sanctioning, with remarks, an estimate of Rs 7,909 inclusive of establt. charges for certain improvements to

Cross References.

Estimate. Channel System } Madura Dt.

Read the following:—

Note by the Chief Engineer for Irrigation Roc No 711/10-Dy 11. 7. 12.

38 6

Circulated to

Print notes

ORDER—No. 2741, dated 25.7.12.

Recs.

The following estimate is sanctioned:—

Imperial.

Capital Expenditure not charged to Revenue

49—Irrigation.

Koryar System

Open Capl Account.

274-I

I Works. 38 P

2. Main Canals & Branches

C. Works.

Unremunerative Work

Improvements to No 1 Branch Channel,

Estimate —

	Rs
I Works.	6.430
II Establt.	1.479
Total.	7.909

2 This sanction is registered as No 37 D of 1912–13 and will expire on the 31st March 1913.

3 The attention of the S.E. VI Circle, is drawn to paras 2 & 3 of the foregoing note by the E.D., and that of the A.G to para 4 thereof

pp 41-47 C.f.

[signature] 11/2/12 [signature] 11/7/12

[signature] 9.7.12

sent 22/10 18/10

To

the Chief Engr for Irrign

" Supg Engr: VI Circle with plans & Estimate (including those connected with Repairs).

" A.G, Madras

[initials] 9.7.12

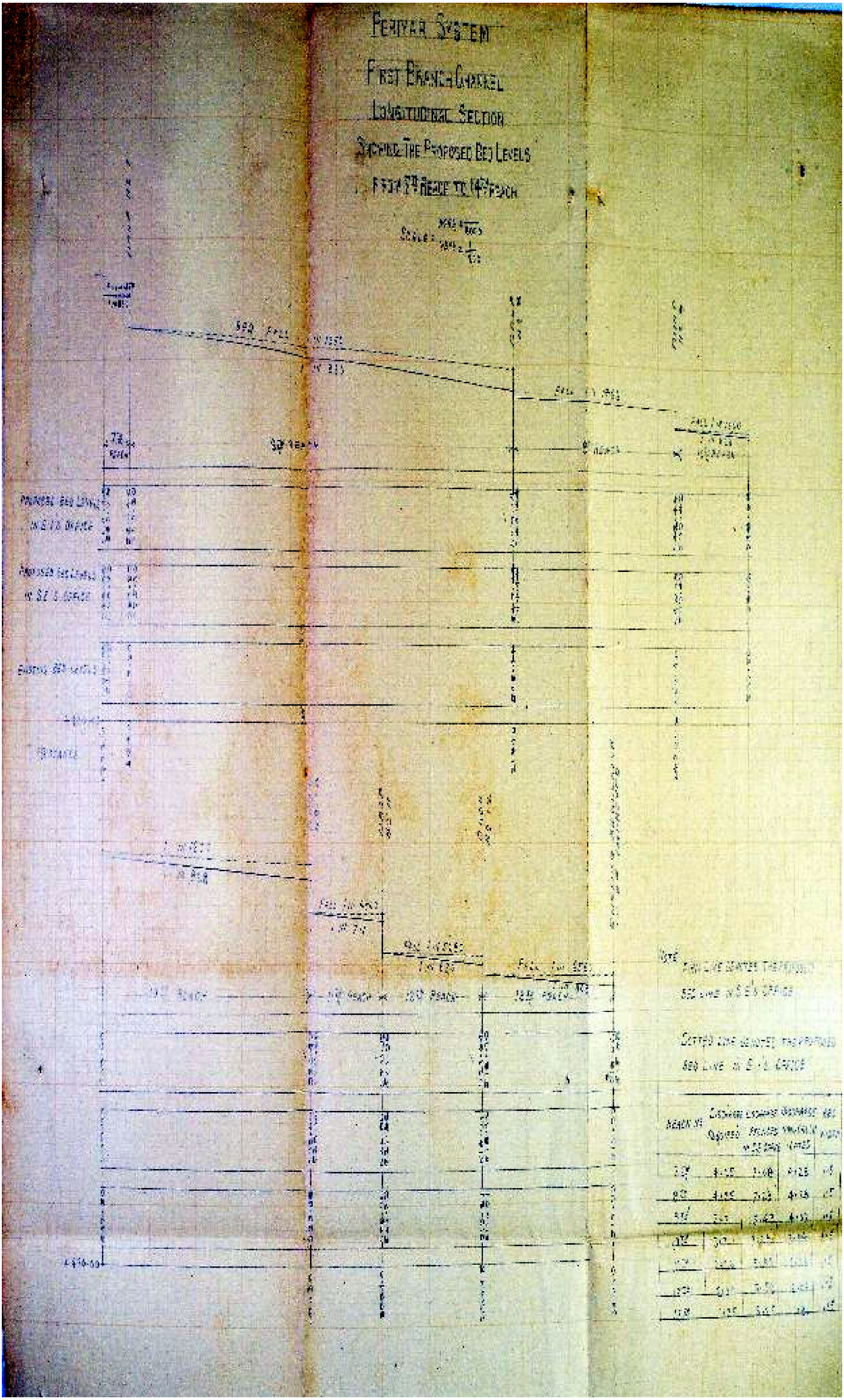
DESPATCHED 30 JUL 1912

74

3 BV

Plans recd from S.E. office on 30/7/12 through ... Encl 22-7-12 23/7

Encl


Periyar System
First Branch Channel
Longitudinal Section
Showing The Proposed Bed Levels
From 5th Reach to 14th Reach
Scale:
Proposed Bed Levels in E.E's Office
Proposed Bed Levels in S.E's Office
Existing Bed Levels
Distances
Note
Dotted line denotes the proposed bed line in E.E's Office
Reach No
Required

Vol 1 — 4098
Aut 1–2
274
43